

CLAIMS

What is claimed is:

1           1.    An apparatus, comprising:

2           a needle to contact and penetrate tissue; and

3           a device coupled to the needle, the device adapted to  
4   measure a depth of tissue penetration.

1           2.    The apparatus of claim 1, further comprising:

2           a needle sheath disposed around a portion of the device  
3   and the needle to provide protection for the tissue from the  
4   needle.

1           3.    The apparatus of claim 1, wherein the device  
2   includes:

3           a first conductive component coupled to the needle, the  
4   first conductive component moves proximally upon contact with  
5   and penetration into the tissue; and

6           a second conductive component disposed at a  
7   predetermined distance from the first conductive component,  
8   the second conductive component arranged to generate an  
9   electrical signal upon contact with the first conductive  
10   component, wherein one of the first conductive component and  
11   the second conductive component is selected to move in

12 response to a resistive force by the tissue upon penetration  
13 by the needle.

1 4. The apparatus of claim 3, wherein the first  
2 conductive component is conductive at least at a portion  
3 where the first conductive component contacts the second  
4 conductive component.

1 5. The apparatus of claim 3, wherein the second  
2 conductive component is conductive at least at a portion  
3 where the first conductive component contacts the second  
4 conductive component.

1 6. The apparatus of claim 3, further comprising:  
2 a spring assembly coupled to the needle and the first  
3 conductive component, said spring adapted to separate the  
4 first conductive component from the second conductive  
5 component.

1 7. The apparatus of claim 6, wherein the spring  
2 assembly includes a spring machined out of proximal portion  
3 of the needle.

1 8. The apparatus of claim 7, further comprising:  
2 weld joints arranged to couple the spring to a proximal  
3 and a distal part of the needle.

1        9.    The apparatus of claim 6, further comprising:  
2        a slip-fit joint arranged to couple the needle tip to  
3        the proximal portion of the needle assembly.

1        10.   The apparatus of claim 6, further comprising:  
2        a weld joint arranged to attach proximal end of the  
3        spring assembly to proximal portion of the needle.

1        11.   The apparatus of claim 3, further comprising:  
2        an insulator disposed on the needle in a region between  
3        the first conductive component and the second conductive  
4        component, the region including an area where the first  
5        conductive component is slidably moving to prevent the second  
6        conductive component from contacting the needle.

1        12.   The apparatus of claim 1, wherein the needle  
2        includes a tube to enable delivery of fluid through the  
3        needle.

1        13.   An apparatus, comprising:  
2        a spring-loaded needle to contact and penetrate a tissue  
3        wall;  
4        a first conductive element coupled to the needle, the  
5        first conductive element slidably movable upon contact with  
6        and penetration into the tissue wall; and  
7        a second conductive element disposed at a predetermined  
8        distance from the first conductive element, the second

9     conductive element arranged to generate an electrical signal  
10    upon contact with the first conductive element.

1       14.   The apparatus of claim 13, wherein the  
2    predetermined distance indicates distance penetrated by the  
3    needle into the tissue wall.

1       15.   The apparatus of claim 14, wherein the  
2    predetermined distance is approximately 0.5 millimeter.

1       16.   A method, comprising:  
2       penetrating a tissue wall with a needle assembly, the  
3    needle assembly comprising:  
4       a needle,  
5       a first conductive element coupled to the needle, and  
6       a second conductive element disposed at a predetermined  
7    distance away from the first conductive element,  
8       wherein the needle penetrates the tissue wall and such  
9    penetration allows the first conductive element to slidably  
10   move toward the second conductive element; and  
11       delivering an appropriate treatment agent through the  
12   needle assembly once contact between the first conductive  
13   element and the second conductive element is made.

1        17. The method of claim 16, further comprising:  
2        providing an electrical connectivity from the first and  
3        second conductive elements to signal a contact between the  
4        first conductive element and the second conductive element.

1        18. The method of claim 17, wherein providing an  
2        electrical connectivity includes extending insulated wires  
3        from the contact and penetration sensor to each of the first  
4        and second conductive elements.